

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated August 12, 2005 (Paper No. 0805). In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Also, submitted concurrently herewith is an Information Disclosure Statement. Entry and consideration of this Information Disclosure Statement is respectfully requested.

Status of the Claims

Claims 1 through 3 are currently pending in the above-identified application. Claims 1 through 3 are being amended to correct formal errors, place the claims in better form and to more particularly point out and distinctly claim the subject invention. Entry of the amendments to Claims 1 through 3 is respectfully requested.

Formal Rejection

Claims 1 through 3 were rejected under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite in view of the “wherein” clause in relation to the method steps. In response, Claims 1 through 3 have been amended and include amendments addressing this rejection under 35 U.S.C. § 112, second paragraph. Therefore, withdrawal of the 35 U.S.C. § 112, second paragraph, rejection of Claims 1 through 3 is respectfully requested.

Prior Art Rejections

Claim 1 was rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,649,138 to Adams et al., hereinafter the Adams ‘138 patent. This rejection is respectfully traversed.

Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) over the Adams ‘138 patent in view of the Torimoto et al. (J Phys Chem. B 2001) document, hereinafter the Torimoto document. This rejection is respectfully traversed.

The above rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) will be considered collectively.

It is respectfully submitted that the Adams ‘138 patent and the Torimoto document do not disclose:

a method for converting materials for modifying surfaces of semiconductor nanoparticles, including the steps of: modifying semiconductor nanoparticles with oil-soluble materials for surface modification; converting the oil-soluble materials for surface modification into water-soluble materials for surface modification at the interface between an organic solvent and water; and shifting the semiconductor nanoparticles from an organic phase to an aqueous phase by the conversion, as respectively recited in independent Claim 1;

a method for purifying semiconductor nanoparticles, including the steps of: modifying semiconductor nanoparticles with oil-soluble materials for surface modification; converting the oil-soluble materials for surface modification into water-soluble materials for surface modification at the interface between an organic solvent and water; shifting the semiconductor nanoparticles from an organic phase to an aqueous phase by the conversion; and subjecting the semiconductor nanoparticles, the surfaces of which have been modified with the water-soluble materials for surface modification, to size-selective photoetching, thereby regulating particle sizes of the semiconductor nanoparticles and monodispersing the semiconductor nanoparticles, as respectively recited in independent Claim 2; and

a method for purifying semiconductor nanoparticles, including the steps of: modifying semiconductor nanoparticles with oil-soluble materials for surface modification; converting the oil-soluble materials for surface modification into water-soluble materials for surface modification at the interface between an organic solvent and water; shifting the semiconductor nanoparticles from an organic phase to an aqueous phase by the conversion; and subjecting the semiconductor nanoparticles, the surfaces of which have been modified with the water-soluble materials for surface modification, to size-selective photoetching, whereby the dissolution caused thereby is utilized to peel the surfaces of the semiconductor nanoparticles, thereby converting the materials for surface modification, as respectively recited in independent Claim 3.

In contrast, the Adams '138 patent discloses that a modifying group on the surface of a semiconductor nanoparticle is further modified with a hydrophilic group that causes a hydrophobic interaction with the modifying group.

Further, as to the Adams' 138 patent, the Office Action states that the Adams '138 patent "does not disclose to use size-selective photoetching". (Office Action, page 3)

However, in accordance with the present invention, such as shown in Fig. 1 of the above identified application, semiconductor nanoparticle surface-modifying material is converted by a step of converting the oil-soluble materials for surface modification into

water-soluble materials for surface modification at the interface between an organic solvent and water, such as respectively recited in Claims 1 through 3, as, for example, from TOP to MPA, for a later performed photoetching, such as respectively recited in Claims 2 and 3.

Also, the methods of the present invention can provide or be utilized in a technique whereby a semiconductor nanoparticle, such as modified with thiol and the like, for example, is processed by photoetching so as to isolate the thiol, so as to promote accurate particle size control and purification.

Thus, the hydrophobic interaction between modifying groups, as disclosed by the Adams '138 Patent, does not disclose the methods for converting materials for modifying surfaces of semiconductor nanoparticles or for purifying semiconductor nanoparticles, as in the present invention and, therefore, differs from the claimed subject matter of the present invention.

Further, it is respectfully submitted, that it would not be obvious to combine the Adams '138 patent with the Torimoto document to arrive at the claimed subject matter of the present invention, such as respectively recited in Claims 2 and 3.

In this regard, it is respectfully submitted that the Torimoto document discloses a method including using thiol for modification purposes after performing particle-size control using a size-selective photoetching method. Such disclosure of the Torimoto document, it is further respectfully submitted, does not disclose or suggest a technical relevance to be combined with the Adams '138 patent's disclosure of a hydrophobic interaction between modifying groups.

Therefore, in view of the foregoing, it is respectfully submitted that Claims 1 is not anticipated by the Adams '138 patent, and Claims 2 and 3 are not obvious over the Adams '138 patent in view of the Torimoto document.

Withdrawal of the 35 U.S.C. § 102(e) rejection of Claims 1 and withdrawal of the 35 U.S.C. § 103(a) rejection of Claims 2 and 3 are respectfully requested.

Double Patenting Rejections

Claims 1 through 3 were rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1 through 9 of U.S. Patent No. 6,911,082 to Sato et al., hereinafter the Sato '082 patent. This rejection is respectfully traversed.

In contrast, the Sato '082 patent, referring to Figure 1 thereof, discloses an intermediate step involving TOP for obtaining multiple layers using ZnS and the like. In this

regard, Claim 1 of the Sato '082 patent, from which Claims 2 through 9 therein ultimately depend, includes a step of coating the semiconductor nanoparticles in the layer to which the stabilized semiconductor nanoparticles have been transported with multiple layers.

In contrast, in accordance with the present invention, referring to Figure 1 of the above identified application, for example, the semiconductor nanoparticle surface-modifying material is converted, such as from TOP to MFA, and not for obtaining multiple layers, but as can be utilized for a later-performed photoetching. In this regard, it is respectfully submitted that Claims 1 through 3 of the above identified application do not recite such multiple layer step as in the Sato '082 patent.

Therefore, it is respectfully submitted that the Claims 1 through 3 of the above identified application are not obvious over Claims 1 through 9 of the Sato '082 patent.

Withdrawal of the obviousness type double patenting rejection of Claims 1 through 3 of the above identified application over Claims 1 through 9 of the Sato '082 patent is respectfully requested.

Also, Claims 1 through 3 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1 through 5 of the co-pending U.S. Application Serial No. 10/453,546, filed June 4, 2003.

In response to the obviousness-type double patenting rejection of Claims 1 through 3 over Claims 1 through 5 of the co-pending U.S. Application Serial No. 10/453,546, filed June 4, 2003, submitted concurrently herewith is a Terminal Disclaimer in this regard.

Therefore, withdrawal of the obviousness-type double patenting rejection of Claims 1 through 3 over Claims 1 through 5 of the co-pending U.S. Application Serial No. 10/453,546, filed June 4, 2003, is respectfully requested.

Reconsideration and allowance of Claims 1 through 3 is respectfully requested.

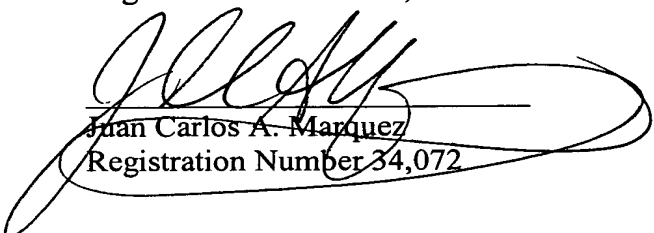
Conclusion

In view of all the above, Applicants respectfully submit that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

Respectfully submitted,

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